Prenatal Exposure to Polycyclic Aromatic Hydrocarbons (PAHs) & Respiratory Symptoms in Young Infants

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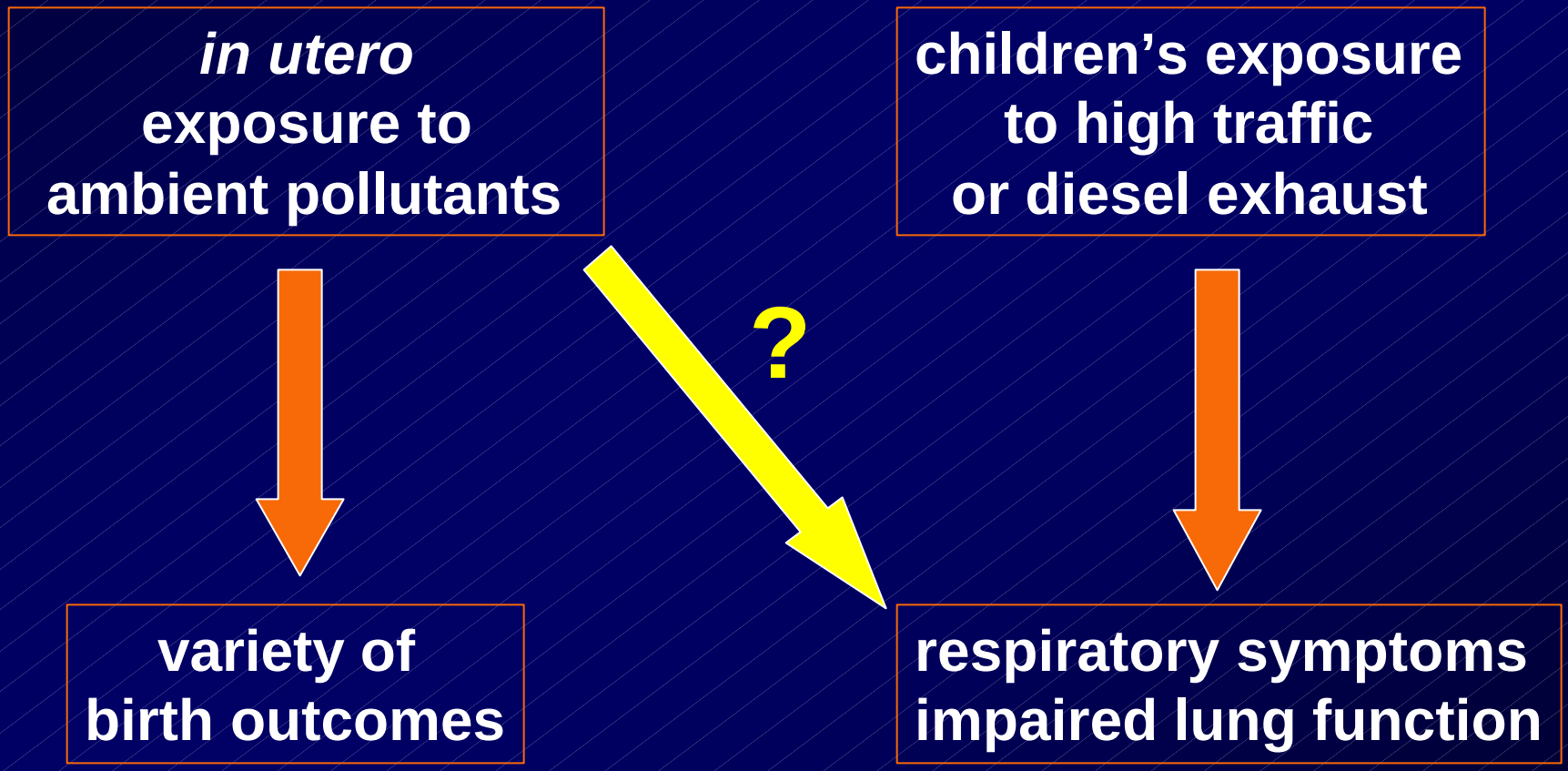
Air Resources Board

California Environmental Protection Agency

Background


in utero exposure to ambient pollutants
children's exposure to high traffic or diesel exhaust
?
variety of birth outcomes
respiratory symptoms impaired lung function

Study Design

- Study in Harlem, South Bronx, and Washington Heights (New York City)
  - Subjects predominantly Latina or African American
  - Range of median household incomes: $12,000 - $22,000
  - High level of combustion-generated pollution
- Exposure assessment:
  - Personal behaviors questionnaire
  - Personal monitoring during third trimester of pregnancy
  - Mother and newborn cotinine levels
- Newborns followed prospectively

Miller et al. (2004). Chest 126(4): 1071-1078

Results

- Every pregnant woman had measurable PAH exposure (average = 3.65 ng/m^3; range 0.27 - 36.47 ng/m^3), a highly toxic component of combustion pollution
- 33% - 45% of infants were exposed to environmental tobacco smoke (ETS)
- Prenatal PAH exposure combined with postnatal ETS exposure resulted in 25-60% more respiratory symptoms and increased severity with infant age

PAHs may act synergistically with ETS to worsen respiratory health of infants

Other Prenatal Effects of Air Pollution

Health Outcome	Ambient Pollutant	Citation (Location)
Low birth weight	SO_2, TSP, CO, or TSP + SO_2, or SO_2 + NO_2 + PM_{10}	Wang et al. 1997 (Beijing) Bobak 2000 (Czech Rep) Rogers et al 2000 (US) Maisonet et al. 2001 (US) Lin et al. 2001 (Taiwan)
Premature birth	SO_2, NO_2, PM_{10}, CO, ozone	Xu et al. 1995 (Beijing) Bobak 2000 (Czech Rep) Ritz et al. 2000 (So. Calif)
Heart defects	CO, ozone	Ritz et al. 2002 (So. Calif)
Neonatal respiratory deaths	TSP, SO_2, NO_X	Bobak & Leon 1999 (Czech Rep)

Conclusions & Research Implications

- First study suggesting link between prenatal exposure to ambient air pollution and respiratory health of infants

Potential Research Directions for Prenatal Effects